

In re Patent Application of
RAYNOR
Serial No. 10/786,878
Filed: FEBRUARY 25, 2004

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In the Claims:

This listing of claims replaces all prior versions and listing of claims in the application.

Claims 1-10 (Canceled).

11. (Previously presented) An image sensing structure comprising:

at least one photodiode comprising

a layer comprising a first conductivity type epitaxial layer and having an upper surface,

a well of a second conductivity type having opposing sides and positioned in said layer comprising the first conductivity type epitaxial layer, said well defining a collection node, and

an isolation trench at least partially bounding an upper portion of said well at the opposing sides thereof and comprising a shallow trench isolation (STI) having a depth from the upper surface of said layer comprising the first conductivity type epitaxial layer less than the depth of said well.

12. (Previously Presented) An image sensing structure according to Claim 11, wherein said STI completely bounds the upper portion of said well.

13. (Canceled).

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14. (Previously Presented) An image sensing structure according to Claim 11, wherein said well comprises an N-well.

15. (Previously Presented) An image sensing structure according to Claim 11, wherein said layer comprising the first conductivity type epitaxial layer comprises a P-well.

16. (Canceled).

17. (Previously Presented) An image sensing structure according to Claim 11, wherein an upper surface of said at least one photodiode is substantially defined by said STI.

18. (Canceled).

19. (Previously Presented) An image sensing structure according to Claim 11, wherein a width of said at least one photodiode is less than or equal to 10 micrometers.

20. (Previously Presented) A CMOS image sensing structure comprising:

a semiconductor substrate; and

at least one photodiode in said semiconductor substrate and comprising

a layer comprising a P-type conductivity epitaxial layer and having an upper surface,

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a well of an N-type conductivity having opposing sides and positioned in said layer comprising the P-type conductivity epitaxial layer, said well defining a collection node, and

an isolation trench at least partially bounding an upper portion of said well at the opposing sides thereof and comprising a shallow trench isolation (STI) having a depth from the upper surface of said layer comprising the P-type conductivity epitaxial layer less than the depth of said well.

21. (Previously Presented) An image sensing structure according to Claim 20, wherein said STI completely bounds the upper portion of said well.

22. (Canceled).

23. (Canceled).

24. (Previously Presented) An image sensing structure according to Claim 20, wherein an upper surface of said at least one photodiode is substantially defined by said STI.

25. (Previously Presented) An image sensing structure according to Claim 20, wherein an n-p junction is formed at an interface between said STI and said well.

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26. (Previously Presented) An image sensing structure according to Claim 20, wherein a width of said at least one photodiode is less than or equal to 10 micrometers.

Claims 27-35 (Canceled).

36. (Previously presented) An image sensing structure according to Claim 11 wherein the depth of the STI is about 2 μm and the depth of the well is about 3 μm .

37. (Previously Presented) An image sensing structure comprising:

at least one photodiode defining a pixel having a width, said at least one photodiode and comprising

a layer having a first conductivity type and having an upper surface,

a well of a second conductivity type having opposing sides and positioned in said layer, said well defining a collection node, and

an isolation trench at least partially bounding an upper portion of said well at the opposing sides thereof and comprising a shallow trench isolation (STI) having a depth from the upper surface of said layer less than the depth of said well and having a width substantially extending over the width of the pixel,

an n-p junction being formed at an interface between said STI and said well.

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38. (Previously Presented) An image sensing structure according to Claim 37, wherein said layer comprises a first conductivity type epitaxial layer.

39. (Previously Presented) An image sensing structure according to Claim 37, wherein said STI completely bounds the upper portion of said well.

40. (Previously Presented) An image sensing structure according to Claim 37, wherein said well comprises an N-well.

41. (Previously Presented) An image sensing structure according to Claim 37, wherein said layer comprises a P-well.

42. (Previously Presented) An image sensing structure according to Claim 37, wherein an upper surface of said at least one photodiode is substantially defined by said STI.